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)OME ANATOMICAL STUDIES ON THE THYROID GLAND)F CALF AND ADULT CAMEL

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SUMMARY

The left and right lobes of the thyroid gland of calf and adult camel were located laterally and asymmetrically on the neck region normally between the first and seventh tracheal rings. The two lobes were connected by glandular isthmus. Infrequently an accessory lobe was observed caudal to the principal thyroid lobes. The omohyoid muscle completely covered the thyroid lobe laterally. The thyroid lobes received their blood supply via the cranial and caudal thyroid arteries which entered the cranial and caudal and extremities respectively. and its innervation from the vagus nerve

INTRODUCTION

The is paucity of anatomical information on the thyroid gland in the neck varies greatly in different animals . In equines is situated 2 cm caudal to the larynx (Venzke, 1975). In ruminants, the gland is located on the cricoid cartilage. In sheep the gland is present as far as the 7th tracheal ring (Venzke, 1975). In polyprotodont (Yamaski, 1993), the thyroid gland is situated just caudal to the thyroid cartilage.

Variations also occur regarding shape and thickness of the isthmus which connects the two lobes. It has ben reported that the ishmus is glandular in some animals and fibous in other (Venzke, (1975) Bugge (1967) and Yamasaki (1990). Furthermore, the isthmus may cross the ventral aspect of the trachea at the level of the first few traceal rings or more caudally as far as the level of 9th and 10th tracheal rings. On the other hand the isthmus may often be absent as the in the dog, cat and man (Bone, 1982), and in polyprotodont (Yamasaki, 1993).

Voith (1970), Booth and ghoshal (1977) and Silva, Oris, Dias, Fermandes and Pacheco (1978), have demonstrated the presence of accessory thyroid tissue in dogs on the borders of the larynx as well lateral to the trachea and in the cranial mediastinum.

The objective of this paper is to study the anatomy of the thyroid gland in calf and adult camels.

MATERIAL AND METHODS

Twenty eight head and neck specimens of calf camels and of adult camels were used in this study. Twenty five of these specimens were dissected in the slaughter house in order to determine the exact position of the right and left lobes in relation to the larynx and tracheal rings. They were also used to study the attachment of the isthmus to each lobe and its tracheal crossing.

The remaining three head and neck specimens were treated as follows:-

The left and right common carotid arteries were cannulated and perfusion was carried out first with normal saline to which heparin was added and then with calaured was added. The perfusion continued until the injected material came out of the jugular venis. The common carotid arteries togethet with the jugular venis were lighted. Each head and neck specimen was left for one hour to allow the gelatine to set. Then immersed in 10%formalin for 48 hours. Carefull dissection was performed to reveal the topographical relations of the thyroid gland. In addition, dissection of the nerves and arteries supplying the thyroid gland was performed with the aid of a dissecting microscope.

RESULTS

In all specimens except one, the thyroid gland was located caudal to the larynx anywhere from the level of the first to the tenth tracheal ring. No thyroid tissue was observed caudal to the tenth tracheal ring. The gland was dark red in colour and so firm in texture. It consisted of two lateral lobes which were connected at their caudal extremities by an isthmus (Fig. 1,2 &)3. Each lobe was wider at its middle and tapered at both extremities. When the accessory lobe present, the caudal end was broad and was subdivided into two parts. One part was continued with the isthmus, the other was connected to the accessory thyroid tissue (Fig. 2 & 3).

Variations existed as regard to the distance each lobe extended caudal to the larynx. This indicates asymmetry in position of the two lobes in relation to the trachea; asymmetry occuring of about 92% of calf camels and 88% of adult camels. However

Fig. 1: Dissection of the thyroid gland region showing asymmetrical thyroid lobes (TL) connected by an isthmus (I). The isthmus has an inverted U-shape L, Larynx; O, omohyoideus muscle (cut and reflected laterally); St, sternothyroideus muscle; T, trachea.

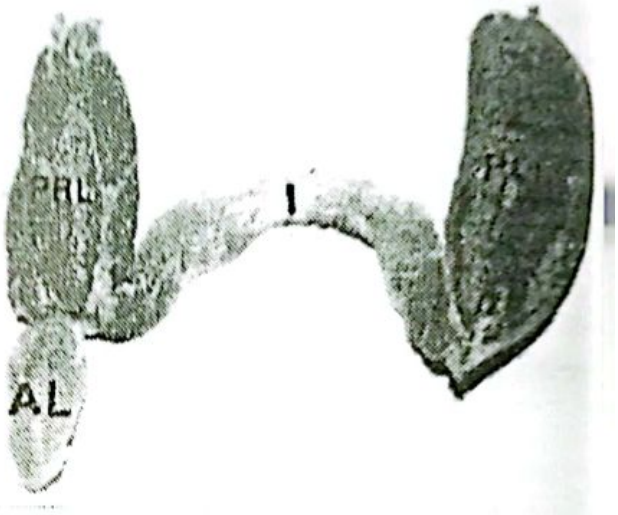

Fig. 2: Showing principal right and left thyroid lobes (PRL, PLL), accessory thyroid lobe (AL) and and isthmus (I) following their removal. Note that the isthmus is thick and connects the caudal extremities of the principal lobes. The accessory thyroid lobe is attached to the principal right lobe. No accesory lobe is present on the left side in this specimen.

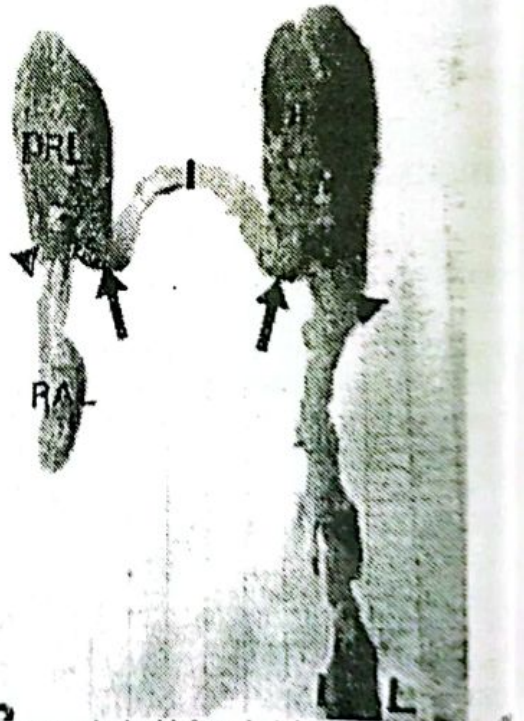

Fig. 3: Showing principal left and right thyroid lobes (PRL), isthmus (I), and left and right accessory lobes (LAL,RAL). Note that the caudal extremity of each of the principal lobes is subdivided into two parts. One part is continued by the isthmus (arrow), the other (arrow head) is continued by the accessory tissue whih connects to the accessory lobe. Note that the right accessory lobe is located furgher caudal than the left acceessory lobe.

5 camels only (2 calves and 3 adults) showed symmetrical lobes. The asymmetry did not show a constant pattern regarding the cranial and caudal extremities of the lobes to the tracheal rings (see Table 1 and Fig. 1). The right lobe was sometimes more cranial to the left lobe and in others the vice versa. The location of the cranial extremity of either lobe varied from the level of the first tracheal ring to the level of the fourth tracheal ring in the both calf and adult camel. However, in one case (adult camel) the cranial extremity was situated more cranially, at the level of the cricoid cartilage whereas in another case it was situated more caudally at the level of the fifth tracheal ring. The caudal extremity of either lobe in calf and adult camels was located anywhere from the level of the fourth tracheal ring to the level of the ninth tracheal ring. In one adult camel the caudal extremity was observed to be situated more caudally at the level of the tenth tracheal ring.

The isthmus which connects the caudal extremities of the two thyroid lobes was always present, but it showed different shapes and crossed the ventral aspect of the trachea at different levels. The isthmus was sometimes thick and broad (Fig. 2 & 3) and in others was thin and narrow. It was frequently observed to cross the ventral aspect of the trachea at the same level as that of one of the caudal extremities of the two lobes. However, in some cases the tracheal crossing of the isthmus was at a level cranial to the caudal extremities of the lobes thereby forming an inverted U-shape (Figs. 1 & 3), or at a level caudal to the caudal extremities of the two lobes thus forming a U-shape (Fig. 4). The latter

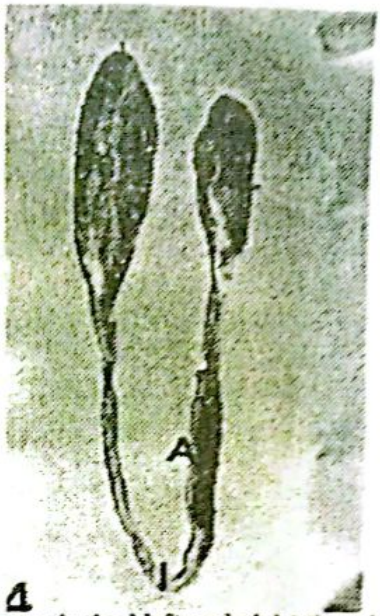

Fig. 4: Showing principal left and right thyroid lobes (PLL, PRL) and an accessory throid lobe (AL). The AL is present on the left side only. It is connected to the caudal extremity of the principal left lobe by an accessory tissue. Note that the isthmus (1) does not connect the principal two lobes, instead it connects the accessory lobe to the caudal extremity of the principa; right lobe. The isthmus has a U-shape.

Table (1): Location of the left and right thyroid lobes in relation to the larynx and Tracheal rings in both calf and adult camel. Thyroid glands were studied in 25 calf camels & in 25 Adult camels.

Larynx & Tracheal rings	Calf camel				Adult camel			
	Right lobe		Left lobe		Right lobe		Left lobe	
	Cranial Extremity	Caudal Extremity	Cranial Extremity	Caudal Extremity	Cranial Extremity	Caudal Extremity	Cranial Extremity	Caudal Extremity
Cricoid cart.	--	--	--	--	1 (4%)	--	1 (4%0	--
1st. Trach. Ring.	7 (28%)	--	2 (8%)	--	5 (20%)	--	9 (36%)	--
Sec. Trach. Ring.	6 (24%)	--	14 (56%)	--	9 (36%)	--	5 (20%)	--
3ed. Trach. Ring.	11 (44%)	--	6 (24%)	--	7 (28%)	--	5 (20%)	--
4th. Trach. Ring.	1 (4%)	3 (12%)	3 (12%)	--	2 (8%)	2 (8%)	5 (20%)	--
5th. Trach. Ring.	--	5 (20%)	--	8 (32%)	1 (4%)	6 (24%)	--	1 (4%)
6th. Trach. Ring.	--	9 (36%)	--	5 (20%)	--	7 (28%)	--	3 (12%)
7th. Trach. Ring.	--	7 (28%)	--	7 (28%)	--	7 (28%)	--	10 (40%)
8th. Trach. Ring.	--	--	--	4 (16%)	--	1 (4%)	--	5 (20%)
9th. Trach. Ring.	--	1 (4%)	--	1 (1%)	--	2 (8%)	--	4 (16%)
10th. Trach. Ring.	--	--	--	--	--	--	--	1(4%)
11th. Trach. Ring.	--	--	--	--	--	--	--	1 (4%)

arrangement has only been observed in three specimens.

Accessory thyroid tissue (Figs. 2,3 & 4) was only observed in four specimens (2 adults and 2 calf camels). In the adult camel, the accessory thyroid tissue was present on the left side of the neck in the form of an accessory lobe (Fig.4) which was connected to the principal left lobe by a thin glandular tissue similar to that of the isthmus. The isthmus in this case did not connect the caudal extremities of the principal left and right lobes but connected the accessory lobe to the caudal extremity of the right lobe. In the calf camel the accessory thyroid tissue was either present on the left and right sides of the neck (Fig. 3) or on the right aspect of neck only (Fig. 2). It appeared as an extension of the caudal extremity of the lobe. It was narrow at its origin and assumed the form of a small lobe at its end. The accessory thyroid tissue on the left side extended futrher caudally than that on the right side. The isthmus in such a case was seen to connect the caudal extremities of the two principal lobes (Figs. 2 & 3).

Each of the thyroid lobes had the following relations:- Medially, it was related to the trachea to which it was attached by loose connective tissue. A branch from the vagus nerve was also present on the medial aspect of the thyroid lobe (Fig. 5). Infrequently one of the cranial cervical lymph nodes was also present on this aspect. Laterally, the gland was related to the vagosympathetic trunk, common carotid artery (Figs. 5 & 6) omowhyoideus and

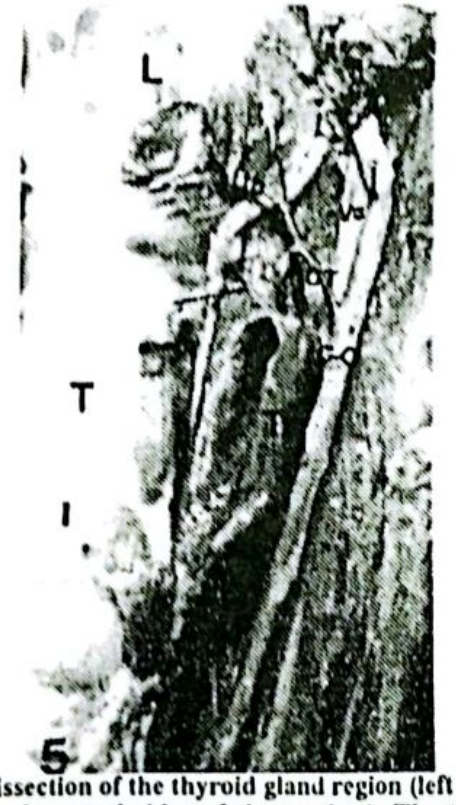

Fig. 5: Dissection of the thyroid gland region (left lateral and ventral sides of the trachea). The thyroid lobe (TL) is moved a little bit laterally to expose the vagal branch (thick arrow), running between the trachea (T) and TL. The vagal branch gives a branch (thin arrow) to the TL. Note that the cranial thyroid artery (CL) arises from the common carotid artery (CC) a little bit cranial to the cranial extemity of TL. It gives a branch (t) to the TL, a branch (th) to the thyrohyoidens muscle and a branch (l) to the larynx. I, isthmus; L, larynx; Vs, Vagosympathetic trunk.

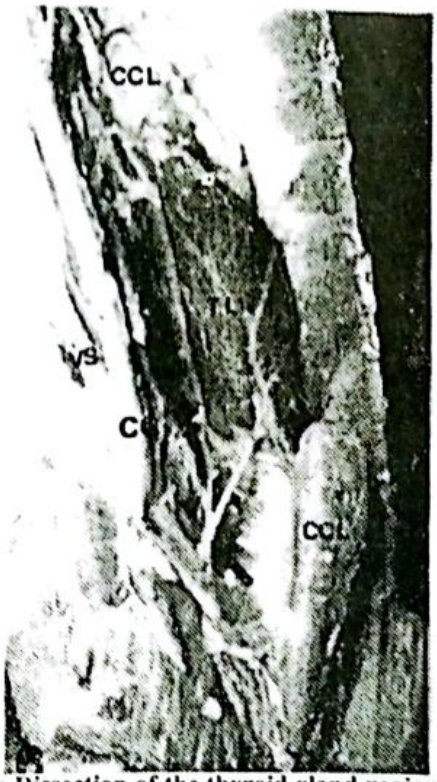

Fig. 6: Dissection of the thyroid gland region (right side The cranial cervical lymph nodes (CCL) are consistanly related to the cranial and caudal extremities of the thyroid lobe (TL). The common carotid artery (CC) and vagosympathetic trunck (VS) are present lateral to the TL. Note that the caudal thyroid artery (thick arrow) arises from the C caudal to the caudal extremity of the TL. It divides into two branches one enters the caudal extremity of the TL (thin arrow), the other supplies the oesophagns (arrow head). I, isthmus; T, trachea.

sternomandibularis (Figs. 7 & 8). The omohyoideus formed a broad sheet that covered the thyroid lobe directly (Figs. 7 & 8). Ventrally it was related to the sternothyroideus muscle (Figs. 7 & 8). The cranial cervical lymph nodes have a constant relations with the cranial and caudal extremities of thyroid lobes (Fig. 6).

The thyroid gland lobes received their blood syply via two arteries which arose from the common carotid artery (Figs. 5 & 6). these arteries were the cranical and caudal thyroid arteries. The cranial thyroid artery arose at the level of/or a little bit cranial to, the cranial extremity of the thyroid lobe (Fig. 5). It soon divided into three branches which were distributed to the thyroid lobe, steenothyroideus muscle, and larynx. The branch to the thyroid lobe entered at the cranial extermity of the lobe. The caudal thyroid artery arose a little bit caudal to the caudal extremity of the thyoid lobe (Fig. 6) and it divided into two branches, one of which entered the lobe at its caudal extremity. The other supplied the oesophagus.

Innervation of the gland was furnished by tiny branches from a vagal branch which ran on the medial aspect of the thyroid lobe. The nerve entered the thyroid lobe at its cranial extremity together with the artery (Fig. 5).

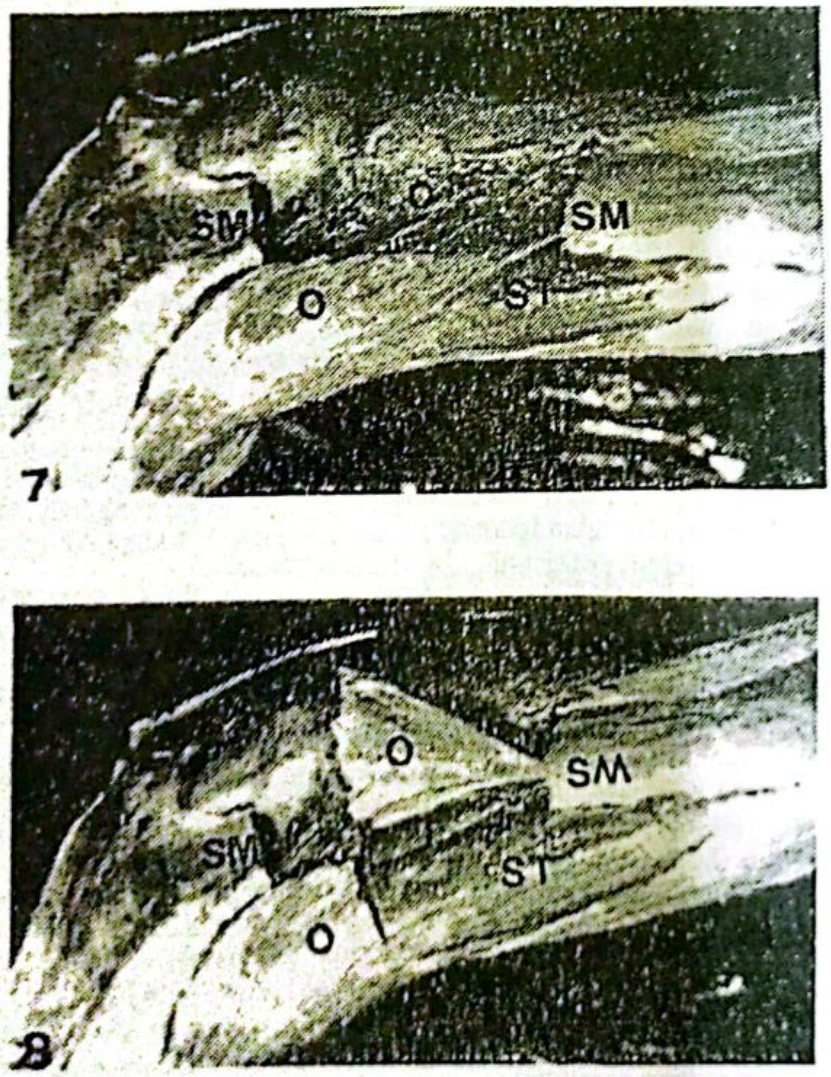

Fig. 7 & 8: Dissection of the thyroid gland region showing the muscles which are related to the thyroid gland laterally and ventrally. O, omohyoideus; SM, steniomandibularis; ST, stemothyrohyoideus; T, thyroid gland lobe.

DISCUSSION

The thyroid gland of the camel as observed in the persent study occupied a more caudal position to the larynx compared to equines and bovines (Venzke, 1975) and polyprotdont (Yamasaki, 1993). It was found anywhere between the first and tenth trached rings, but on most cases between the second and seventh tracheal rings. This location resembled that of sheep (Venzke, 1975) and differed fom that of equines, bovines and polyprotodonts (Venzke, 1975; Yamasaki, 1993) whose thyroid glands lies in contact with the larynx or the first two tracheal rings. The two lobes of the gland were asymmetrically located on the lateral aspects of the trachea in the vast majority of the dissections (about 92% in calf camel and 88% in adult camel). However, symmetrical lobes were observed in five dissections only (two calves and three adult camels).

Accessory thyroid tissue has not been reported before in the camel or other ruminants. However, it has been shown to occur in dogs by Voith (1970) He showed that it is frequently found around the larynx, lateral to the trachea, and in the cranial mediastinum. In the present study, accessory thyroid tissue was only observed in four dissections out of the 56 dissections. It appears to be somewhat different from that described by Voith (1970) in that it is present as an accessory lobe connected to by principal lobe by thin glandular tissue. The accessory lobe was present either unilaterally or bilaterally on the neck.

The isthmus which normally connects the caudal extremities of the two thyroid lobes was described by Venzke (1975) as being thin and fibrous in the horse or thick and glandular in ruminants. In dog, its presence was controversial. Silva et al. (1978) have observed an isthmus in the thyroid gland of dogs whereas Bone (1982) has reported that the isthmus was often absent. It was definitely absent in polyprotodonts (Yamasaki, 1993).

The blood supply of the thyroid gland of the camel resembled that of equines and bovines. The cranial and caudal thyroid arteries arose direct from the common carotid artery and entered the cranial and caudal extremities of the thyroid lobes respectivley. However, in the rat (Yamasaki, 1990) and inpolyprotodonts (Yamaski, 1993) the origin of the cranial thyroid artery varies from the extenal carotid artery to the common carotid artery. As far as the caudal thyroid artery was concerned, Booth & Ghoshal (1977) and Yamasaki (1993) have agreed that such an artery should be renamed the tracheo oesephageal artery. Bugge (1967) has stated that a true caudal thyroid artery is absent in mamals.

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